



Classrooms for the Future

Year 2 Evaluation

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September 16, 2008

Executive Summary

The purpose of the Classrooms for the Future (CFF) initiative is to transform Pennsylvania's high schools, making them more engaging and more responsive to the economic challenges presented by globalization. This high school reform initiative is at the same time an effort to enhance teaching and learning, an effort to promote access to technology, an effort to foster the effective use of that technology, and an effort to enhance our ability to compete in an increasingly global marketplace. As such, this reform initiative is increasing the number of powerful computers available for student use, with the goal of a laptop computer on every student desk in every public high school classroom in which the four core subjects are taught. CFF is also providing increased access to technology for teachers, with a multimedia teaching station in each classroom, and is making a significant investment in the professional development of teachers, providing face-to-face and online learning experiences, and providing the ongoing assistance required to support a change of this magnitude.

This evaluation used classroom observations by trained observers, teacher and student surveys, and interviews with CFF coaches, principals, building contacts, and technology coordinators to assess the progress being made. Although this is the second year of the program, the results in this report must still be considered preliminary, as the skills the teachers and students are developing take time, and contract negotiations and other issues delayed the arrival and installation in schools (especially in Year One), limiting their use by teachers and students. The primary purpose of this report is to look for signs of change in progress – changes in teaching activity, in student activity, in teacher attitudes, and in student attitudes. A preliminary report on changes in student achievement will follow shortly, as the results of the statewide testing have only recently become available.

The evidence we have collected indicates that the desired changes do appear to be underway.

Some of the statistically significant results that were visible in data collected from CFF sites include:

- **Changes in Classroom Organization**

Observers in both Years One and Two reported that the physical organization of some classrooms is changing, from the familiar pattern of desks in rows (designed to promote the delivery of information from the teacher to the student) to more classrooms organized as clusters of three to five desks, which promotes collaboration and group work.

- **Changes in Teacher Activity**

Observers in both Years One and Two reported that in the "post" observations, teachers were spending significantly less time in whole class lecture and were spending more time working with individual students and walking through the room observing, and interacting with students. This observation was verified by data from the teacher and student surveys, and again verified by comments made by CFF principals, technology coordinators, and coaches.

- **Changes in Educational Goals**

Teacher and students surveys and interviews with CFF leaders all provide evidence that teachers are more likely to engage students in activities requiring higher order thinking as a result of the CFF program.

There were significant increases in the use of project- or problem-based learning, authentic learning, multi-modal teaching, peer teaching, and in both informal collaborative learning and collaborative learning with formal assigned roles to participants.

Significant increases from pre to post observations were observed in time spent focusing on the development of most of the identified 21st century skills, including Visual Literacy, Teaming or Collaboration Skills, E-communication Skills, Social or Personal Responsibility, Self Direction , Creativity, Use of Real World Tools, The Ability to Produce High-Quality Products, and Planning, Prioritizing, and Managing Work. Significant differences were not found for Scientific Literacy, Cultural Literacy or Global Awareness, and Higher Order Thinking.

- **Changes in Teaching Activity Associated with Student Achievement**

Although this report does not directly examine changes in student achievement (which will be investigated in a separate report in the coming months), we did use the "Teaching Performance Record" (TPR) classroom observation protocol to evaluate teacher activities based on five domains of activity that have been linked, through prior research, with increases in student achievement. Statistically significant increases in teacher behaviors associated with all of the five domains were identified, implying that teachers are working in ways that are more directly associated with increasing student achievement.

- **Changes in Student Activity and Level of Engagement**

The pre/post analysis of surveys, classroom observations, and interviews indicates that students spent significantly less time listening to the teacher in

large group settings. Students spend more time working independently and in groups, and are more likely to be working on reports, projects or presentations. Students are more likely to be able to demonstrate their learning in a variety of ways, more likely to be able to choose projects based on interest, and more likely to be working at their own pace. Student work is more likely to be assessed using a rubric to assess the quality of the product or project.

Teachers and observers reported that students spent significantly less time "off task" (doing things other than what the teacher had intended), but students reported that they spend slightly more time off task.

The *percentage* of students engaged was relatively high in both pre and post observations. Significant pre/post differences on the teacher survey indicate that more students were engaged, and the classrooms observations confirmed that the percentage of students engaged had increased during the last third of the class. Evidence from the class observations also showed that the level of student engagement, and the degree of interest being shown, was also greater during all three thirds of the class session (beginning, middle, and end).

- **Changes in Technology Use**

As might be expected, there was a significant decrease in the number of students who were observed not using technology at all during the lesson, and a corresponding increase in the number of students observed to be using technologies almost the entire class period.

On the post survey, only 4% of teachers reported that their students use the computers 80% of the time or more, and 39% still reported that their students are using the computers less than 20% of the time. Student reports of the time they spend using computers were much higher, with 19% reporting that they use the computers more than 80% of the time and 15% reporting that they use the technologies less than 20% of the time.

- **Changes in Teacher Attitudes**

Changes in teacher attitudes related to the value of technologies exhibited between the pre and post surveys were small, perhaps because approximately 75% of teachers perceived technologies as either valuable (47%) or very valuable (28%) at the time of the initial survey. The percentage reporting that they felt technologies were very valuable had increased by 10% by the time of the post survey.

At the end of the school year, 14% more teachers reported that given the tools and resources available to them, the experience they were able to offer their students was very good (up 7% to 48%) or excellent (up 7% to 29%).

Approximately 73% of teachers feel better prepared to teach this year than last year, although about 20% expressed the belief that they do not yet have the technology skills needed to teach their subjects using the best methods available.

Ninety-one percent of teachers reported that they are working harder than they were in past years, and approximately the same number (85%) reported that they are also working longer.

Approximately 76% of the teachers reported that the CFF coach had been either valuable (40%) or very valuable (36%), and the three services the coaches provide that were considered by teachers to be most important were:

- Suggesting ways to incorporate technology to teach the content in their classes
- Teaching them to operate computers, networks, or software programs, and
- Providing professional development.

- **Obstacles to Successful Implementation**

This complex, multifaceted reform initiative presents a series of challenges its leaders must understand in order to overcome. The top three issues reported by teachers are: 1) computer failures, 2) the need for continuing professional development; 3) and network downtime.

Progress is being made in terms of the time required to repair or replace a faulty computer and to reduce and quickly end network downtime, as reported by both teachers and students. There were significant differences between pre and post assessments of time to repair a failed computer, and now more than 63% of students estimate that computers are repaired in one day or less. On the PATI survey teachers indicated significantly greater levels of satisfaction with technical support than non-CFF teachers, and also indicated greater access to instructional support that helps them integrate technology.

- **Changes in 21st Century Skills**

One of the primary purposes of CFF was to help Pennsylvania's students develop "21st Century Skills," skills that will allow them to compete and thrive in a very competitive global economy. Although these skills and attributes are very difficult to measure and, therefore, are rarely the focus of research or evaluation, we feel compelled to work toward the development of processes and measures that will allow us to monitor progress in these areas, which include critical thinking, problem solving, creativity, teamwork, online research, electronic communication skills, and self-directed learning.

Although these skills and abilities develop over longer periods of time and might not be anticipated at this early stage of the CFF program, as part of this evaluation, we ran a preliminary study comparing students from two CFF schools that had implemented CFF as intended, to "control schools" selected based on demographic and past performance variables to be similar to the CFF schools in the study. We recruited paid volunteer subjects from these schools, who worked with us on a Saturday toward the end of the school year. The compensation and recruitment processes were the same in both locations.

These students took a creativity test, developed and delivered a presentation on an assigned topic, took a content test on the topic of their presentation, took a formal reasoning test, and participated as a member of a team in a group problem-solving activity.

The presentations and group problem-solving activities were videotaped and scored by blind reviewers. The tests were also scored and the data from these sources were analyzed to determine whether any significant differences existed between the two groups.

A series of small but significant differences emerged, indicating that:

- On the creativity tests, CFF students outperformed control students in "Elaboration" and "Resistance to Premature Closure," while the control students outperformed CFF students in "Fluency and "Abstractness of Titles."
- On the presentation development task, CFF students outperformed control students in "Use of Sources," while the control students outperformed CFF students in "Mechanics," and
- During presentation delivery, CFF students outperformed control students in body language.

No significant differences were found in any of the other variables. Remember that these skills take time to develop, and that CFF is currently a very "part time" experience for most students. These skill differences may become more prominent as more students have more time with the technologies, under the leadership of teachers who have had more time to think deeply about how to use them to accomplish both content area goals and to develop 21st century skills.

The pages that follow are designed to summarize the findings from our different sources of information, synthesizing a great deal of information in a more visual form. In the tables below you will find the columns to be our sources of information (the various surveys, observations, and interviews). If you want more information you can note the source of the data at the top of the column and find the data table in the appendix that corresponds to that data source, using the question number (i.e. "Q14") to navigate within the appendix. The rows in the charts below are the CFF research questions. Where the data related to these research questions have produced statistically significant findings

indicating changes you will see a green cell. The dark green cells indicate very strong evidence, generally from multiple sources and/or both Years One and Two. The lighter green cells indicate that some of our evidence produced statistically significant differences, but not all, or that the differences were statistically significant, but are due to very small shifts from category that do not appear to justify confidence that the anticipated progress is being made. The occasional red cell indicates a statistically significant finding that is not in the desired direction – one that seems to warrant attention. "NSD" in the tables indicates that there was no significant difference found for that item. An empty white cell means only that that source of information was not used for that particular question, but a white cell with text in it either means that there were no significant differences or that the question called for a list of topics rather than for a comparison of past to present.

Table ES-1: Summary of Findings Related to Teaching Practice

CFF's Impact on Teaching Practice	Teacher Surveys	Student Surveys	CFF Classroom Observations	CFF Leader Interviews
1. Has CFF changed classroom layout (arrangement of desks, etc.)?	Q1 Y1=Yes Y2 = Yes Fewer rooms with desks in rows, more small clusters of desks.		Q2 Y1=Yes Fewer rooms with desks in rows, more small clusters of desks. Y2 = Yes	
2. Has CFF changed the percentage of time teachers spend lecturing and in other activities?				
Whole Group Lecture/instruction	Q2a Y1=Yes. Less Y2=Yes. Less	Q2b Y1=Yes. To the middle Y2=Yes. Less	Q3a Y1=Yes. Less, all thirds. Y2=Yes. Less second and final thirds only	Less lecture
Leading Whole Class Discussion	Q2b Y1=NSD Y2=Yes. Less	Q2a Y1=Yes. To the middle Y2=Yes. Less	Q3b Y1=NSD Y2=NSD	
Working with Small Groups of Students	Q2c Y1=NSD Y2=Yes. More	Q2c Y1=Yes. More Y2=Yes. More	Q3c Y1=Yes. More Y2=Yes. More	More work with individuals
Working with Individual Students	Q2d Y1=NSD Y2=Yes. More	Q2d Y1=Yes. More Y2=Yes. More	Q3d Y1=Yes. More Y2=Yes. More	More work with groups
Walking, observing & Interacting with students	Q2e Y1=NSD Y2=Yes. More	Q2e Y1=Yes. To the middle. Y2=Yes. Less	Q3d Y1=NSD Y2=NSD	
At desk, working	Q2f Y1=Yes. More Y2=Yes. More		Q3e Y1=NSD Y2=NSD	
3. Has CFF changed the "complexity" of class content, moving from "basic skills" to more "higher-order" topics?	Q3 Y1=NSD Y2=Yes More HO	Q3 Y1=Yes. More HO Y2=Yes. Less HO	Q35, 10, 15 Y1=Yes. More HO Y2=Yes. More HO	Greater focus on higher order skills
4. Has CFF changed the "instructional style" exhibited by the teacher, on a scale from "didactic" to "constructivist"?	Q4 Y1=NSD Y2=Yes. More Constructivist	Q4 Y1=Yes. Y2=Yes. More Constructivist	Q6, 11, 16 Y1=Yes. Y2=Yes. More Constructivist	More student-centered activity
5. Has CFF changed the "relevance" of class content, moving from "artificial" to more "real world" in nature.	Q5 Y1=Yes. Y2=Yes. More Authentic or "Real World"		Q7, 12, 17 Y1=Yes. Y2=Yes. More Authentic or "Real World."	

CFF's Impact on Teaching Practice (continued)	Teacher Surveys	Student Surveys	CFF Classroom Observations	CFF Leader Interviews	PATI Survey
6. What technologies are being used in the different subject areas, and how is this changing as a result of CFF?			Q 21, 24 Y1=Yes. Y2=Yes. More tech use by teachers and students.		
7. Are teachers experiencing any changes in classroom management (discipline problems, time lost in transitions, etc.) as a result of CFF?	Q14h Y1=NSD Y2=NSD		Q2b Y1=Yes. Classroom management improved. Y2=NSD.	Discipline problems have decreased.	
8. Are teachers comfortable teaching in CFF classrooms?	Q14i Y1=NSD Y2=NSD Comfort levels are high.		Q 20 Y1=Yes. Y2=Yes. Started comfortable & got more so.	Teachers are comfortable and willing to take risks.	Q29c NSD Comfort levels are high.
9. What different software applications are being used in CFF classrooms?	Q 8 a-o Y1=Yes. Increases in 11 of 17 categories Y2=Yes. All 17 categories	Q 11 a-l Y1=Yes. Increases in all categories Y2=Yes. All categories	Q 22 Y1=Yes. Increases in 11 of 17 categories. Y2=Yes. All 17 categories	Increased use of Internet research, blogs, & Wikis.	Q 19 Yes. CFF Teachers used 6 of 8 categories more than non-CFF teachers
10. What instructional strategies are used in CFF classrooms?	Q 9 a-l Y1=Yes. Y2=Yes. Decrease in value of lecture & increase in student-centered strategies.		Q 23 Y1=Yes. Y2=Yes. Decrease in use of lecture & increase in student-centered strategies.	Increased use of learner-centered strategies.	
11. Do the instructional strategies used by CFF teachers appear to change in ways supported by the TPR's five research-based domains?			Y1=Yes. Increases in 2 of 5 domains Y2=Yes. Increases in all 5 domains.		
12. Is there a difference in the attention paid to "21st century skills" in CFF classrooms?	Q2e Y1=NSD Y2=Yes. More attention paid to 21st century skills.	Q1 Y1=Yes. Y2=Yes. Stronger agreement that school develops work skills.	Q 27 Y1=Yes. Increases in 10 of 12 domains. Y2=Yes. Increases in 9 of 12 domains.	Students are developing 21st century skills.	

Table ES-2: Summary of Findings Related to Student Activity

Impact on Student Activity	Teacher Surveys	Student Surveys	CFF Classroom Observations	CFF Leader Interviews
1. Has CFF changed the level of student engagement?	Q7 Y1=NSD Y2=Yes More Engaged	Q5 Y1=Yes Y2=Yes Small, but significant changes in interest in the topics taught -- in the wrong direction.	Q 4, 9, 14 Y1=NSD for % Engaged, YES, for Level of Engagement. Y2=Yes for both % (last 1/3) and level (all thirds)	CFF leaders report increases in student engagement.
2. Has CFF changed percentages of time students are...				
Listening to the teacher (in a large group setting)	Q10a Y1=NSD. Y2=Yes. Less time.	Q6a Y1=Yes, but to middle. Y2=Yes. Less time.	Q27a Y1=Yes. 12% less. Y2=Yes. 13% less.	CFF leaders report less time spent in lecture.
Listening to other students (in a large group setting)	Q10b Y1=Yes. More Time Y2=Yes. To middle.	Q6b Y1=NSD. Y2=Yes. Slightly less time.	Q27b Y1=Yes. 8% less. Y2=NSD.	
Working independently	Q10c Y1=NSD (Close) Y2=Yes. To middle.	Q6c Y1=Yes. More Time. Y2=Yes. More, but very small.	Q27c Y1=NSD. Y2=NSD. (but close)	
Working in groups	Q10d Y1=Yes. More Y2=Yes. More	Q6d Y1=Yes. Toward middle. Y2=Yes. More, but very small.	Q27d Y1=NSD. (but close) Y2=NSD. (but close)	
Talking with the teacher in 1-to-1 or small group conversations	Q10e Y1=NSD Y2=Yes. More	Q6e&f Y1=Yes. More Time. Y2=Yes. More, but small.	Q27e Y1=NSD. Y2=NSD. (but close)	
Off Task	Q10f Y1=NSD Y2=Yes. Less time off task.	Q6g Y1=Yes. More Time (off task). Y2=Yes. More time off task.	Q27f Y1=Yes. 2% less off task. Y2=NSD.	CFF leaders report less off task behavior.

Impact on Student Activity (continued)	Teacher Surveys	Student Surveys	CFF Classroom Observations	CFF Leader Interviews	PATI Survey
3. In CFF classrooms, how much time do students spend using computers?	Q10g Y1=Yes. Students spend more time with tech. Y2=Yes. Students spend more time with tech.	Q6h Y1=Yes. Students spend more time with tech. Y2=Yes. Students spend more time with tech.	Q26 Y1=Yes. 29% fewer used tech not at all, and 18% more used tech almost the entire period. Y2=Yes. 16% fewer used tech not at all, and 27% more used tech almost the entire period.		Q12 Y2 = YES. CFF students spend more time with tech than non-CFF students do.
	(However, at the end of Y2, 39% of teachers report that their students spend only 0% to 20% of their time using computers.)				
4. Does CFF change the type of products on which students' grades are based?	Q11a-g Y1 & Y2 = Yes. More grading emphasis on reports, presentations, projects, & group work. In Y2, less on tests & quizzes.	Q7a-h Y1 & Y2 = Yes. More grading emphasis on reports, presentations, independent projects, & group projects. In Y2, less on tests & quizzes.	Q18 Y2=Yes. Students are more likely to be: <ul style="list-style-type: none"> • working on a clearly defined task • able to demonstrate learning in a variety of ways • choose products based on interests • assessed using a clear rubric • choose whether to work independently or in groups, and • allowed to work at their own pace. 		